13-11-13-DTP7-RM-1

Con. 8055-13.

F.E. CB45 NOV. 13 sem II 545- maths. 21/11/13

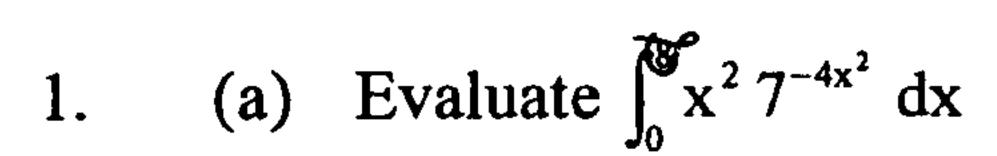
(Revised course)

(3 Hours)

[Total Marks: 80]

N.B.: (1) Question No. 1 is compulsory.

- (2) Answer any three questions from question nos. 2 to 6.
- (3) Figures to the right indicate full marks.
- (4) Programming Calculators are not allowed.



(b) Solve $(D^4+4)y = 0$

(c) Prove that $E \nabla = \Delta = \nabla E$

(d) Solve $(x + 2y^3) \frac{dy}{dx} = y$.

(e) Evaluate $\int_{r}^{3} dr d\theta$ over the region between the circles $r = 2 \sin \theta$, $r = 4 \sin \theta$.

(f) Evaluate $\int_{0}^{1} \int_{y}^{\sqrt{x}} \frac{x}{(1-y)\sqrt{y-x^2}} dydx$

(a) Solve: $(x^3y^4 + x^2y^3 + xy^2 + y) dx + (x^4y^3 - x^3y^2 - x^2y + x) dy = 0$

Change the order of integral and hence evaluate $\int_{0}^{5} \int_{2-\infty}^{2+x} dxdy$

(c) Prove that $\int_0^1 \frac{x^2}{\sqrt{1-x^4}} dx \int_0^1 \frac{dx}{\sqrt{1+x^4}} = \frac{\pi}{4\sqrt{2}}$ (a) Evaluate $\int_0^1 \int_{y^2}^{1-x} \int_0^{1-x} x \, dx \, dy \, dz$.

6

Find the area of one loop of the lemniscate $r^2=a^2$.cos2 θ

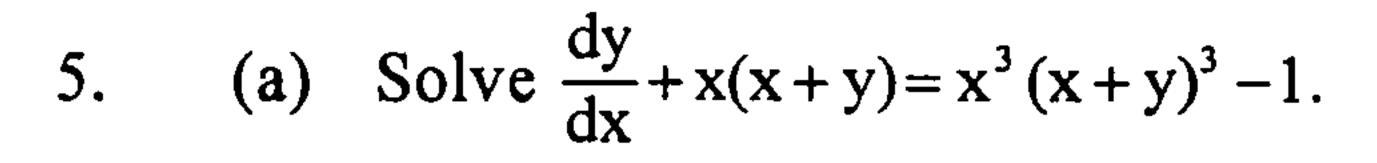
(c) Solve $(D^3+2D^2+D)y = x^2e^{3x}+\sin^2x+2^x$.

6

(a) Show that the length of arc of the parabola $y^2 = 4ax$ cut off by the line 3y = 8x is

(b) Using the method of variation of parameters solve $\frac{d^2y}{dv^2} + 4y = \tan 2x$.

(c) Compute y(0.2) given $\frac{dy}{dx}$ + y + xy² = 0, y(0) = 1 by taking h = 0.1 using Runge-Kutta method of fourth order correct to 4 decimals.



- (b) Solve $\frac{dy}{dx} 2y = 3e^{x}$, y(0) = 0 using Taylor series method. Find approximate value of y for x = 1 and 1.1.
- (c) Evaluate $\int_0^6 \frac{dx}{1+x}$ using
 - (i) Trapezoidal rule
 - (ii) Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule and
 - (iii) Simpson's $\left(\frac{3}{8}\right)^{th}$ rule.

Compare result with exact values.

6. (a) The current in a circuit containing an inductance L, registance R and voltage 6
E sin wt is given by

 $L \frac{di}{dt} + Ri = E \sin wt$ If i = 0 at t = 0, find i.

- (b) Evaluate $\iint_{R} e^{2x-3y} dxdy$ over the triangle bounded by x + y = 1, x = 1, y = 1.
- (c) Find the volume of solid bounded by the surfaces $y^2 = 4ax$, $x^2 = 4ay$ and the planes Z = 0, Z = 3.
 - (ii) Change to polar co-ordinates and evaluate

 $\int_{0}^{a} \int_{\sqrt{ax-x^{2}}}^{\sqrt{a^{2}}-x^{2}} \frac{dxdy}{\sqrt{a^{2}-x^{2}-y^{2}}}$